

Meridian Observations of the Great Comet (b) 1882 with the Transit Circle of the Royal Observatory, Cape of Good Hope.

	App. R.A.			App. Decl.	Observer.
	h	m	s		
Sept. 17	11	31	49.06	+ 1° 37' 25".3	Gill
18	11	22	33.76	+ 0 28 50.3	"
22	11	1	59.00	- 2 30 5.7	"

Heliometer Observation of Great Comet (b) 1882.

	Cape Mean Time.	App. R.A.	App. Decl.	Observer.
	h m s			
Sept. 8	17 13 58	144° 59' 52".1	- 0° 56' 30".1	Elkin

Notes on the Great Comet (b) 1882. By David Gill, LL.D., Her Majesty's Astronomer at the Cape of Good Hope.

The comet was first seen by Mr. Finlay, chief assistant, on Sept. 7, about 17^h, when on the way to his house, after observing an occultation of 5 *Canceri*.

It was then a conspicuous object, the nucleus appearing to the naked eye as bright as a star of the third magnitude. Returning at once to the equatorial, Mr. Finlay secured comparisons with an 8th magnitude star, but from an error in reading off the Declination circle the comparison star was not at first properly identified, and hence the erroneous motion in declination which I telegraphed to the Astronomer Royal.

The following morning an excellent series of measures of position angle and distance from ι *Hydræ* were secured by Dr. Elkin with the heliometer; and Mr. Finlay, with the equatorial, obtained comparisons with an 8th mag. star. My own hands were closely tied in the evening with heliometer measures for stellar parallax [it was then the epoch of maximum parallax for α *Centauri* with my comparison stars] and with measures of *Victoria* and *Sappho* extending far into the early morning. Notwithstanding these engagements, after two hours' sleep I made an attempt on Sept. 9 to secure heliometer observations, but was only able to get a rough place from the circle readings whilst the comet was visible for a few minutes between clouds. A period of cloudy and rainy weather now set in, during which the comet could only be occasionally seen before sunrise by glimpses between clouds, and it became obvious that if observations were to be made at all, some exceptional means must be adopted to secure them—means that would enable an absolute place to be secured from a single pointing whenever opportunity offered.

Accordingly I resolved to dismount the photoheliograph, to

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shift its portable observatory to a site commanding the eastern horizon, and to mount in it the great Indian theodolite.*

The work was begun on the morning of the 15th during torrents of rain, and by eleven o'clock at night the theodolite was mounted and adjusted. The following morning I was rewarded by two glimpses of the comet, and two observations of its difference in altitude and azimuth from the Sun.

The morning of Sunday, the 17th (civil reckoning), was cloudy till after sunrise, but improved in a few hours sufficiently to permit a long series of altazimuth observations to be made. In the afternoon it became evident that the comet could be followed to conjunction with the Sun's limb, and this observation was actually secured both by Mr. Finlay and Dr. Elkin.† The observation is described in the accompanying notes by the observers themselves.

The following morning, at Simon's Bay, I was astonished at the brilliancy of the comet as it rose behind the mountains on the eastern side of False Bay. There was not a cloud in the sky, only a merging into a rich yellow that fringed the blackish blue of the distant mountains, and over the mountains and amongst the yellow an ill-defined mass of golden glory rose with a beauty I cannot describe.

The Sun rose a few minutes afterwards, but to my intense surprise the comet seemed in no way dimmed in brightness, but becoming instead whiter and sharper in form as it rose above the mists of the horizon. I left Simon's Bay and hurried back to the observatory, pointing out the comet in broad daylight to the friends I met by the way. It was only necessary to shade the eye from direct sunlight with the hand at arm's-length to see the comet with its brilliant white nucleus, and dense white, sharply-bordered tail of quite $\frac{1}{2}^\circ$ in length.

On arrival at the observatory I heard of all the wonders of the previous day, and in turn pointed out the comet, a brilliant object when viewed by shading the Sun from the eye by interposing the roof of the observatory portico.

I secured a complete meridian observation of the comet, and ten minutes afterwards the Sun's transit.

Numerous observations with the altazimuth were also secured.

* This instrument was constructed by Troughton and Simms, under the superintendence of Colonel Strange, for the great trigonometrical survey of India. It has been kindly lent to me, by General Walker, for some special researches. The telescope has $3\frac{1}{2}$ inches aperture, the horizontal circle is 3 feet in diameter, and the vertical circle 2 feet, reading by 5 and 4 microscopes respectively.

† I myself lost this unprecedented observation by a visit to Simon's Bay, for the purpose of meeting Captain Morris, R.E., as chief of the British Transit of Venus Expedition to Brisbane. Captain Morris had written by a previous mail expressing a strong wish to see me in reference to the Geodetic Survey of South Africa about to be undertaken. The prevalence of small-pox in Cape Town induced the owners of the "*Liguria*" (by which Captain Morris was a passenger) to order her to touch at Simon's Bay instead of Cape Town, and I was thus absent during the whole of Sunday, the 17th.

The following day (Sept. 18, astronomical reckoning), and on Sept. 22, I also obtained meridian observations. The nucleus on the 17th and 18th was as sharply defined and as easily observable as a star of the first magnitude seen by daylight, and the form of the head was also clearly visible. Drawings of the head were made the same afternoon with the 6-inch equatorial. On Sept. 22, the nucleus, as seen in the transit circle, was comparable with a star of the third magnitude seen by daylight, and the rest of the head was barely distinguishable. Cloudy weather prevailed between Sept. 18 and 22, and for some time after the 22nd, preventing my obtaining a longer meridian series.

Advantage has been taken of every available opportunity to secure extra meridian observations since the 22nd.

The results of such determinations of the place of the comet as are immediately available are given in the accompanying paper. The appearance of the comet in the early morning has been, and still continues to be, most grand and imposing.

With a direct vision prism, whose plane of dispersion was placed at right angles to the direction of the comet's tail, a complete yellow monochromatic image of the head, and of a great portion of the tail, was easily visible for a week after perihelion, but this can no longer be seen now.

The changes in the form of the nucleus are of extreme interest, as also is the formation of a delicate outer envelope, whose axis is different from that of the tail.

The description of these changes, and copies of the drawings that have been made, will form the subject of a future communication.

The Great Comet (b) 1882—Disappearance at the Sun's Limb.
By W. H. Finlay, B.A.

On Sept. 7, at 17^h Cape mean time, I saw a comet with a large head and a tail about a degree in length. I secured a number of comparisons of the comet and Arg. -0° , 2229 with the 6-inch equatorial. On the 8th the brightness of both head and tail had increased very considerably. The southern edge of the tail was sharp and brighter than any other part, while the northern half seemed to stop short at some distance from the head. A nucleus was seen, situated towards the south of the centre of the head. I got several comparisons with Arg. -0° , 2256. Bad weather, and the want of comparison stars in the morning light, prevented my getting more observations with the 6-inch before perihelion passage.

On Sunday, Sept. 16 to 17, the comet was visible all day, and Dr. Elkin and myself made a large number of observations with the great Indian theodolite; unfortunately cloud prevented